Philippine Islands

DEPARTMENT OF THE INTERIOR

WEATHER BUREAU

MANILA CENTRAL OBSERVATORY

MIRADOR OBSERVATORY

BAGUIO, BENGUET

A NEW METEOROLOGICAL-GEODYNAMIC STATION
OF THE WEATHER BUREAU

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A NEW METEOROLOGICAL-GEODYNAMIC STATION OF THE WEATHER BUREAU.

I. LOCATION OF THE STATION.

1. **Site.**—The property on which the new station has been established lies within the town site of Baguio, Benguet, close to the western boundary thereof, and comprises an isolated hill, "Mirador" (Mount Lookout), so called on account of the magnificent view which may be enjoyed from its summit. This hill terminates the famous Baguio plateau on the western side. Its top is a level, nearly elliptical, surface, the major axis of which lies NW–SE and measures 132 meters (433 feet), while the minor axis is only 52 meters (171 feet). The mean level of this miniature plateau is 1,511.75 meters (4,969.9 feet) above mean sea level.

Plate I gives an idea of Mount Mirador and the building on its summit as seen from the east. The upper view was taken from a point west of, and below the provincial building ("tribunal"), the lower, with a telephoto lens, near the Constabulary School.

As the mean elevation of the Baguio plateau is 1,444.8 meters (4,740 feet), Mirador rises more than 66 meters (216.5 feet) above the latter and is very conspicuous from every part of the valley. The road to San Fernando, Union, passes at a short distance to the north of Mirador, skirting the limestone hills at an average level of 1,453.9 meters (4,770 feet) above the sea. Toward west a valley, the bottom of whose upper end lies about 152.4 meters (500 feet) below the top of Mount Mirador, stretches from the foot of this hill as far as the coast. Hence the China Sea can be seen on clear days from the top of Mirador to a distance of 119 kilometers (74 miles); that is to say, 77 kilometers (58 miles) beyond the mouth of the Aringay River, which is the nearest point of the coast of Union Province. In this direction the view is limited only by the horizon on the China Sea; the Gulf of Lingayen, the Bolinao Peninsula, and the China Sea beyond are easily made out, as are also many miles of the coast lines of Pangasinan to the north and of Union to the south. The two views on Plate II, taken from different points of the summit of Mount Mirador with lenses of different focal lengths, show the view as it appears under favorable circumstances.

Toward SSW, at a distance of 7.24 kilometers (4.5 miles), stands out prominently Mount Santo Tomas with its three peaks, the highest of which reaches 2,232.6 meters (7,425 feet) above sea level. The relative positions of Mounts Santo Tomas and Mirador are seen on Plate III, the upper view of which is taken through the pine trees on the limestone hills to the NW of Mirador, while the lower is taken from a point approximately NNE thereof. In both pictures the higest peak of Santo Tomas is marked by a small cross.

2. **Building.**—In the center of the elliptical plateau forming the summit of Mount Mirador rises a substantial stone building, 56 meters (183.6 feet) long in the direction of the major axis of the plateau and 14 meters (35 feet) wide in its central part. The latter is in reality flanked by four towers, two at each end, but as each pair of these has a continuous roof, they appear as two cross-wings of 20 meters (65.6 feet) length and 6 meters (19.7 feet) width, giving to the whole structure the form of the letter "I." These towers have a height of 10.7 meters (35 feet) from the ground to the ridge of the roof, while the height of the main building, measured in the same way, is 9.1 meters (30 feet).

The construction was begun in November, 1907, and was sufficiently advanced in the beginning of January, 1909, to allow of the installation of some instruments. At present (September, 1909) the work is finished. A wagon road has been constructed from the San Fernando Road to the top

of the hill. The building serves a twofold purpose: as a sanatorium for the Mission of the Jesuits in the Philippines, and to house a branch station of Manila Observatory for meteorological and geodynamic observations. A fair idea of the institution may be gathered from Plates IV to VI.

The approximate position of Mirador Observatory is:

$$\phi=16° 25' \text{N}; \lambda=120° 36' \text{E}; h=1511.75 \text{ meters.}$$

In the catalogue of all the meteorological stations in the world, published by the Smithsonian Institution in its "Meteorological Tables" (1907), we find only the following stations with elevations greater than that of Mirador Observatory:

Country.	Station.	Height.	Latitude.
NORTH AMERICA.		*m.*	° ′
Canada	Sulphur Mountain	2, 281	51 10 N
United States	Pike's Peak	4, 308	38 50 N
	Santa Fe	2, 138	35 41 N
	Cheyene	1, 855	41 8 N
	Lander	1, 637	42 50 N
	Denver	1, 612	39 45 N
Mexico	Zacatecas	2, 443	22 47 N
	Tacubaya	2, 323	19 24 N
	Mexico	2, 277	19 26 N
	Puebla	2, 169	19 2 N
	Guanajato	2, 024	21 0 N
	San Luis Potosi	1, 890	22 5 N
	Leon	1, 798	21 7 N
	Saltillo	1, 645	25 25 N
SOUTH AMERICA.			
Peru	El Misti	4, 785	16 16 S
	Arequipa	2, 457	16 22 S
Bolivia	Potosi	4, 050	19 38 S
Ecuador	Quito	2, 846	0 14 S
Colombia	Bogota	2, 615	4 35 S
EUROPE.			
Austria	Sonnblick	3, 106	47 3 N
	Obir (Hannwarte)	2, 140	46 30 N
	Obir (Berghaus	2, 044	46 30 N
	Schmittenhöhe	1, 966	47 20 N
Bavaria	Wendelstein	1, 727	47 42 N
Switzerland	Säntis	2, 500	47 15 N
	St. Bernhard	2, 478	45 52 N
	Pilatus-Kulm	2, 067	46 59 N
	Sils-Maria	1, 809	46 26 N
France	Mont Blanc (Grand Mulets)	4, 359	45 ? N
	Mont Blanc (Les Bosses)	3, 021	45 ? N
Prussia	Schneekoppe	1, 603	50 44 N
Russia	Gudaur	2, 204	42 28 N
	Kars	1, 747	40 37 N
ASIA.			
India	Leh-Kashmir	3, 506	34 17 N
	Kodaikanal	2, 343	10 14 N
	Darjeeling	2, 248	27 3 N
	Simla	2, 202	31 6 N
	Murree	1, 930	33 54 N
	Ranikhet	1, 850	29 38 N
	Wellington	1, 800	11 22 N
	Quetta	1, 677	30 11 N
Ceylon	Newera Eliya	1, 902	6 46 N

Fourteen of these stations are within the tropics. East of India, or east of the meridian 82° E, Mirador would be by far the highest meteorological station, were it not for the fact that a few months ago the Japanese Government established one on Mount Fuji. The exact elevation of this station could not be ascertained, but to judge from the uncorrected barometer readings, it would

appear to be approximately 3,550 meters (11,647 feet), which would place it 228 meters (748 feet) below the summit of the snow-capped volcano. Tsukuba, formerly the highest station in Japan, has an altitude of only 870 meters (2,854 feet); and the highest station in Australia, Alice Springs, South Australia, of 587 meters (1,926 feet).

II. SUMMARY REPORT ON CLIMATIC CONDITIONS.

At the request of the United States Philippine Commission a meteorological station was established at Baguio as early as August, 1900, which, shortly after the creation of the Weather Bureau in May, 1901, was incorporated into this Bureau as one of its 8 first-class stations, and equipped with better and more numerous instruments. In 1903 economic reasons made its reduction to third class necessary, and as such it existed until July 1, 1909, when the new observatory was inaugurated.

The data gathered during the period September 1, 1900, to August 31, 1901, have been published during March, 1902, in a pamphlet entitled "The Climate of Baguio, Benguet" (76 pages and 34 plates), which forms Part I of the Annual Report of the Director of the Weather Bureau for 1901–2. Covering only one year, this report could give only a very imperfect idea of the *average* climatic conditions of the Baguio plateau. Further data have since then been published in the Monthly Bulletin and Annual Reports of the Weather Bureau, from which a sufficiently accurate knowledge may be had of the climate of the "Simla of the Philippines."

The following summary of all available observations may be interesting. It confirms the idea that Baguio is eminently fit to become *the* health resort of the Philippines and possibly of the entire tropical regions of the Far East. Only those elements will be considered which constitute climate properly so called, to wit, temperature, humidity, cloudiness, and rainfall.

1. TEMPERATURE, 1900-1908.

The following table gives the various temperature means for every month of the year, as deduced from eight years' observations; likewise the highest and lowest temperatures recorded during each month within the period under consideration, together with the year in which they were recorded:

Month.	Mean maximum.		Mean minimum.		Monthly mean.		Absolute maximum.			Absolute minimum.		
	°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.	Year.	°C.	°F.	Year.
January	**23.7**	**74.7**	8.6	47.4	16.9	62.4	25.0	77.0	1906	**3.0**	**37.4**	1907
February	24.1	75.3	**7.6**	**45.6**	**16.5**	**61.7**	27.0	80.6	1906	6.0	42.8	1902, 1906
March	25.4	77.7	9.7	49.5	18.0	64.4	27.2	81.0	1906	8.2	46.8	1907
April	25.3	77.5	11.4	52.6	19.1	66.3	**29.3**	**84.7**	1902	9.0	48.2	1902
May	**25.5**	**77.9**	12.5	54.5	**19.1**	**66.4**	28.0	82.4	1902	11.0	51.8	1907
June	24.9	76.9	**14.1**	**57.4**	19.1	66.3	26.4	79.5	1902	13.0	55.4	1902
July	24.4	75.9	13.4	56.2	18.7	65.6	26.5	79.7	1902	12.1	53.8	1906
August	24.2	75.6	12.9	55.2	18.3	65.0	26.2	79.2	1902	10.0	50.0	1902
September	24.1	75.4	13.7	56.7	18.6	65.4	25.5	77.9	1908	12.0	53.6	1902
October	24.7	76.5	13.6	54.2	18.6	65.4	26.0	78.8	1906	10.2	50.4	1906
November	24.6	76.3	10.0	50.0	17.9	64.3	26.0	78.8	1907	6.5	43.7	1905
December	24.1	75.3	10.3	50.5	17.8	64.1	25.2	77.4	1906	8.6	47.5	1904

NOTE.—The extreme values are printed in heavier type.

The values of the preceding table represent the temperatures at an average height of 2.4 meters (8 feet) above ground. Near the ground or on grass the temperature falls decidedly lower, the difference amounting sometimes to more than 3° C., as was the case on March 19, 1908, when the grass-temperature fell 3.6° C. (6.5° F.) below the minimum recorded in the thermometer shelter.

It must be remarked that the observations from which the values given in the foregoing table have been deduced were not made in one and the same place. From 1900 to 1908 the station had

to be transferred repeatedly and has occupied three different points, whose heights above sea level varied between 1,445 and 1,470 meters. The values given correspond to a mean elevation of 1,457 meters (4,780 feet).

The peculiar configuration of the Baguio plateau is largely responsible for the fact that inversions of temperature are frequently met with for small differences in elevation. This fact has been demonstrated by simultaneous observations in different localities made during 1908 and part of 1909. As an illustration, we publish the minimum temperatures recorded at various heights in Baguio during March, 1908, together with the corresponding values for Manila.

In the following table, the letters heading the various pairs of columns under "Baguio" serve to indicate the locations of the thermometers: T, the top of Mount Mirador; M, a place on the slope of the mountain, about midway up; F, the foot of the mountain; F′, the same place, but the thermometer near the ground and exposed to the sky; S, a sink-hole north of Mirador, in which the thermometer was exposed like the preceding.

Day.	Manila.		Baguio.									
	Observatory. Altitude, 3.04 meters (10 feet).		T Altitude, 1,511.8 meters (4,960 feet).		M Altitude, 1,497.1 meters (4,915 feet).		F Altitude, 1,455.4 meters (4,775 feet).		F′ Altitude, 1,452.8 meters (4,766 feet).		S Altitude, 1,431.6 meters (4,697 feet).	
	°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.
1	19.3	66.7	12.7	54.9	12.1	53.8	13.0	55.4	11.6	52.9	4.6	40.3
2	20.4	68.7	15.0	59.0	11.8	53.2	10.5	50.9	9.9	49.8	2.0	35.6
3	19.5	67.1	14.7	58.5	11.1	52.0	13.2	55.8	9.9	49.8	2.0	35.6
4	19.4	66.9	13.0	55.4	10.6	51.1	11.2	52.2	9.6	49.3	4.4	39.9
5	19.5	67.1	12.6	54.7	11.6	52.9	11.8	53.2	9.6	49.3	5.8	42.4
6	18.2	64.8	13.1	55.6	11.9	53.4	13.7	56.7	13.0	55.4	2.9	37.2
7	20.1	68.2	13.6	56.5	9.9	49.8	11.7	53.1	10.7	51.3	1.4	34.5
8	**23.4**	**74.1**	12.0	53.6	10.8	51.4	12.8	55.0	9.9	49.8	2.4	36.3
9	22.8	73.0	12.1	53.8	10.6	51.1	12.7	54.9	9.9	49.8	1.4	34.5
10	22.0	71.6	11.2	52.2	9.9	49.8	11.5	52.7	8.9	48.0	1.9	35.4
11	20.9	69.6	12.3	54.1	11.1	52.0	11.7	53.1	9.9	49.8	4.4	39.9
12	21.2	70.2	12.1	53.8	11.1	52.0	13.1	55.6	11.2	52.2	7.9	46.2
13	21.9	71.4	11.9	53.4	11.0	51.8	12.2	54.0	10.7	51.3	7.9	46.2
14	20.3	68.5	12.2	54.0	11.4	52.5	12.7	54.9	10.7	51.3	7.7	45.9
15	20.7	69.3	12.5	54.5	11.7	53.1	13.0	55.4	11.2	52.2	7.6	45.7
16	18.1	64.6	12.8	55.0	10.6	51.1	12.0	53.6	9.6	49.3	4.4	39.9
17	**17.3**	**63.1**	13.4	56.1	9.9	49.8	11.5	52.7	8.4	47.1	2.6	36.7
18	18.9	66.0	14.8	58.6	9.4	48.9	10.4	50.7	7.2	45.0	0.2	32.4
19	18.4	65.1	**11.0**	**51.8**	**8.9**	**48.0**	**9.2**	**48.6**	**5.6**	**42.1**	**—3.9**	**25.0**
20	18.4	65.1	15.2	59.4	9.8	49.6	10.7	51.3	8.2	46.8	1.3	34.3
21	19.5	67.1	14.2	57.6	10.9	51.6	11.7	53.1	10.1	50.2	4.4	39.9
22	22.0	71.6	15.6	60.1	11.6	52.9	11.6	52.9	10.4	50.7	6.4	43.5
23	20.8	69.4	15.6	60.1	12.2	54.0	14.1	57.4	13.4	56.1	8.4	47.1
24	19.9	67.8	13.0	55.4	11.6	52.9	12.2	54.0	11.1	52.0	3.7	38.7
25	22.4	72.3	13.9	57.0	**13.8**	**56.8**	13.5	56.3	10.3	50.5	5.5	41.9
26	18.5	65.3	16.0	60.8	12.1	53.8	14.0	57.2	10.4	50.7	4.0	39.2
27	21.0	69.8	15.9	60.6	10.4	50.7	11.6	52.9	9.1	48.4	1.9	35.4
28	21.9	71.4	17.3	63.1	12.4	54.3	12.8	55.0	11.6	52.9	5.7	42.3
29	23.3	73.9	17.0	62.6	13.6	56.5	15.3	59.5	11.4	52.5	9.9	49.8
30	22.5	71.6	13.0	55.4	11.6	52.9	**16.0**	**60.8**	**14.9**	**58.8**	**12.4**	**54.3**
31	20.5	68.9	**18.0**	**64.4**	12.9	55.2	14.1	57.4	12.5	54.5	9.7	49.5
Means	20.4	68.7	13.8	56.8	11.2	52.2	12.4	54.3	10.4	50.7	4.5	40.1

It will be noticed that the differences between the minimum temperatures of Manila and Baguio are frequently smaller than between those of the summit of Mirador and the sink-hole north of the hill, as, for instance, on the 1st, 2d, 3d, 4th, 6th, 7th, 16th, 18th, 19th, 20th, 21st, 22d, 23d, 24th, 26th, 27th, 28th, 29th, 31st; that is, on twenty days out of thirty-one. The difference between the mean temperatures of Manila (h=3.04 meters, 10 feet) and Baguio (h=1,451 meters, 4,780 feet) is 9.97° C. (18° F.), or nearly 1° C. for every 146 meters (1° F. for every 264 feet).

A comparison of the mean and extreme temperatures of Baguio and Simla, the famous health resort of British India, will prove interesting. The values for Simla have been taken from the

Monthly Weather Review of India, the mean values representing the average of several years, while the extremes are those of the period 1901 to 1908. Since a very large percentage of our readers is presumably less familiar with temperatures expressed in the centigrade scale than with the system used by the United States and British meteorological services, we give the table in both the centigrade and Fahrenheit scales.

The elevation of Simla is 2,202 meters (7,224 feet), its latitude 31° 6′ N and its longitude 77° 12′ E. As Simla is not within the tropics, its annual range of temperature must be greater than that of Baguio.

MEAN AND EXTREME TEMPERATURE AT BAGUIO AND SIMLA.

A. CENTIGRADE.

		Mean maximum.		Mean minimum.		Monthly mean.		Absolute maximum.			Absolute minimum.		
		°C.	Δ °C.	°C.	Δ °C.	°C.	Δ °C.	°C.	Year.	Δ °C.	°C.	Year.	Δ °C.
January	Baguio	**23.72**	13.33	8.56	4.12	16.89	11.00	25.00	1906	9.00	**3.00**	1907	10.67
	Simla	10.39		4.44		5.89		16.00	1906		**—7.67**	1905	
February	Baguio	24.06	12.67	**7.56**	2.89	**16.50**	11.50	27.00	1906	8.94	6.00	1902 / 1906	13.50
	Simla	11.39		4.67		**5.00**		18.06	1903		— 7.50	1905	
March	Baguio	25.39	11.83	9.72	1.94	19.06	8.78	27.22	1906	6.89	8.22	1907	14.39
	Simla	13.56		7.78		10.28		20.33	1908		— 6.17	1907	
April	Baguio	25.28	6.89	11.44	0.22	19.06	6.39	**29.28**	1902	5.61	9.00	1902	9.94
	Simla	18.39		11.22		12.67		23.67	1908		— 0.94	1905	
May	Baguio	**25.50**	2.67	12.50	—2.28	**19.11**	0.38	28.00	1902	0.44	11.00	1907	4.06
	Simla	22.83		14.78		18.83		27.56	1906		6.94	1908	
June	Baguio	24.94	2.44	**14.11**	—1.22	19.06	— 0.83	26.39	1902	—2.33	13.00	1902	3.50
	Simla	**22.50**		15.33		**19.89**		28.72	1901		9.50	1907	
July	Baguio	24.39	3.72	13.44	—2.17	18.67	0.39	26.50	1902	—2.61	12.11	1906	0.39
	Simla	20.67		**15.61**		18.28		**29.11**	1901		11.72	1907	
August	Baguio	24.22	4.72	12.89	—2.39	18.33	0.89	26.22	1902	4.33	10.17	1902	— 0.61
	Simla	19.50		15.28		17.44		21.89	1902		10.78	1903	
September	Baguio	24.11	5.17	13.72	0.16	18.56	2.28	25.50	1908	3.16	12.00	1902	2.56
	Simla	18.94		13.56		16.28		21.89	1902		9.44	1901	
October	Baguio	24.72	7.83	12.33	1.77	18.56	4.78	26.00	1906	4.61	10.22	1906	7.33
	Simla	16.89		10.56		13.78		21.39	1907		2.89	1904	
November	Baguio	24.61	11.17	10.00	2.78	17.94	6.83	26.00	1907	7.44	6.50	1905	6.33
	Simla	13.44		7.22		11.11		18.56	1901		0.17	1906	
December	Baguio	24.06	14.39	10.28	6.34	17.83	11.05	25.22	1906	8.61	8.61	1905	13.44
	Simla	**9.67**		**3.94**		6.78		16.61	1909		— 4.83	1903	

B. FAHRENHEIT.

		Mean maximum.		Mean minimum.		Monthly mean.		Absolute maximum.			Absolute minimum.		
		°F.	Δ °F.	°F.	Δ °F.	°F.	Δ °F.	°F.	Year.	Δ °F.	°F.	Year.	Δ °F.
January	Baguio	**74.7**	24.1	47.4	7.4	62.4	19.8	77	1906	16.2	**37.4**	1907	19.2
	Simla	50.6		40.0		42.6		60.8	1906		**18.2**	1905	
February	Baguio	75.3	22.8	**45.6**	5.2	**61.7**	20.7	80.6	1906	16.1	42.8	1902 / 1906	24.3
	Simla	52.5		40.4		**41.0**		64.5	1903		18.5	1905	
March	Baguio	77.7	21.3	49.5	3.5	66.3	15.8	81.0	1906	12.4	46.8	1907	25.9
	Simla	56.4		46.0		50.5		68.6	1908		20.9	1907	
April	Baguio	77.5	12.5	52.6	0.4	66.3	11.5	**84.7**	1902	10.1	48.2	1902	17.9
	Simla	65.0		52.2		54.8		74.6	1908		30.3	1905	
May	Baguio	**77.9**	4.8	54.5	— 4.1	**66.4**	0.5	82.4	1902	0.8	51.8	1907	7.3
	Simla	73.1		58.6		65.9		81.6	1906		44.5	1908	
June	Baguio	76.9	4.4	**57.4**	— 2.2	66.3	— 1.5	79.5	1902	— 4.2	55.4	1902	6.3
	Simla	**72.5**		59.6		**67.8**		83.7	1901		49.1	1907	
July	Baguio	75.9	6.7	56.2	— 3.9	65.6	0.7	79.7	1902	— 4.7	53.8	1906	0.7
	Simla	69.2		**60.1**		64.9		**84.4**	1901		53.1	1907	
August	Baguio	75.6	8.5	55.2	— 4.3	65.0	1.6	79.2	1902	7.8	50.3	1902	— 1.1
	Simla	67.1		59.5		63.4		71.4	1902		51.4	1903	
September	Bagluo	75.4	9.3	56.7	0.3	65.4	4.1	77.9	1908	6.5	53.6	1902	4.6
	Simla	66.1		56.4		61.3		71.4	1902		49.0	1901	
October	Baguio	76.5	14.1	54.2	3.2	65.4	8.6	78.8	1906	8.3	50.4	1906	13.2
	Simla	62.4		51.0		56.8		70.5	1907		37.2	1904	
November	Baguio	76.3	20.1	50.0	5.0	64.3	12.3	78.8	1907	13.4	43.7	1905	11.4
	Simla	56.2		45.0		52.0		65.4	1901		32.3	1906	
December	Baguio	75.3	25.9	50.5	11.4	64.1	19.9	77.4	1906	15.5	47.5	1905	24.2
	Simla	**49.4**		**39.1**		44.2		61.9	1906		23.3	1903	

The table shows the following facts: (1) The mean *minimum* temperatures for May, June, July, and August are lower in Baguio than in Simla, while those for April and September are almost equal. (2) The monthly *means* are nearly the same in Baguio and Simla for the months of May, June, July, August, and September.

2. HUMIDITY, 1900-1908.

Next to temperature, the most important climatic element is the humidity of the air. At Baguio the monthy mean of relative humidity follows approximately the distribution of the annual rainfall, but is rather high throughout the year. December and the months from January to April are the relatively driest months, May to October are wet, while November is characterized by a mean hygrometric state. Simla, owing to its height and continental position, has a low relative humidity throughout the year, except during July, August, and September. But even the mean for the last-named month is lower than for the driest month at Baguio.

MEAN MONTHLY PERCENTAGE OF HUMIDITY AT BAGUIO AND SIMLA.

Town.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Baguio	79	79	80	81	86	87	89	91	89	88	83	81
Simla	36	37	44	47	46	63	88	91	78	52	48	45

3. CLOUDINESS, 1900-1908.

Another climatic factor of considerable influence is cloudiness. The prevalence of clouds at Baguio as compared with Simla is explained by the fact that the former is largely affected by the moisture-laden air currents from the China Sea whose water vapors condense readily over the Baguio plateau, especially during the months of March, April, May, and June, thereby preventing the temperature from rising higher.

MEAN MONTHLY CLOUDINESS AT BAGUIO AND SIMLA (0-10).

Town.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Baguio	4.3	4.7	5.0	5.1	6.5	6.9	7.3	7.9	7.1	6.3	5.6	5.3
Simla	2.3	3.2	4.8	4.1	3.8	5.9	8.8	8.9	5.8	1.5	2.3	3.9

4. RAINFALL, 1900-1908.

The average rainfall of Baguio is heavy during July, August, and September; moderate during May, June, and October; moderate to light during April, November, and December; and light during January, February, and March: the mean annual amount being 3,711.4 millimeters (146.12 inches). Outside of the Archipelago this amount is surpassed only by the rainfall of Cherra Poonjee, one of the hill stations in India, which situated at an altitude of 1,313.3 meters (4,309 feet) receives an average annual amount of 11,146.5 millimeters (438.85 inches), and by that of some stations in Burma. Within the Philippine Islands there are two stations whose annual rainfall surpasses that of Baguio, viz. Baler, on the eastern coast of central Luzon, and Capiz, on the northern coast of Panay Island, both almost at sea level.

Station.	Lat. N.	Long. E.	Rainfall.		Period (years).
			Millimeters.	Inches.	
	° ′	° ′			
Baler	15 40	121 34	3,822.9	150.51	4
Capiz	11 35	122 45	3,858.8	151.92	4

MEAN MONTHLY RAINFALL AT BAGUIO.

Baguio.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Rainfall in millimeters	28.45	8.13	27.43	87.88	398.53	431.80	624.59	990.82	543.82	409.96	101.09	58.93
Rainy days	3	2	4	7	18	21	24	25	23	17	9	6

Plate VII gives a graphic representation of the temperature changes, the relative humidity, and the cloudiness at Baguio, as deduced from observations covering the period 1900–1908, compared with the corresponding data for Simla. The *absolute* maximum and minimum temperatures which occurred during the same period are likewise entered, being marked by small crosses in the case of Baguio and by asterisks in that of Simla.

Persons who are familiar with Baguio will probably wonder why it is that even the absolute minimum for a number of years is reported as above the freezing point, when the formation of a thin crust of ice on little pools of water is nothing uncommon at the mountain resort during winter. We beg to refer these to the table on page 6, where for March 19, 1909, they will find minimum temperatures ranging from +11.0° to −3.9° C., according to the height and manner of exposure of the thermometers. This subject is explained admirably by Dr. Julius Hann, professor of cosmical physics at the University of Vienna. In his "Handbuch der Klimatologie," translated into English by Dr. Robert de C. Ward, of Harvard College (Handbook of Climatology; Macmillan Co., 1903) the celebrated meteorologist says:

Terrestrial radiation; Nocturnal cooling.—There is another and a contrasted effect of the loss of heat by radiation which is of great importance climatologically, and may be directly observed with much greater ease. This is the nocturnal cooling of the free surfaces of bodies to a temperature below that of the air. On clear nights the temperature of the surface of the earth, or of plants, often falls considerably below that of the air at some distance above the earth's surface. The temperature of the air being that of which we wish to obtain a record, thermometers are protected from the effects of nocturnal radiation by means of shelters. This is necessary because thermometers, like almost all other bodies, are much better radiators than the air itself, which cools but slightly by radiation. Different bodies cool, as the result of nocturnal radiation, by different amounts, as is shown by the varying quantities of dew which form upon their surfaces. For climatological purposes the intensity of nocturnal radiation is best measured by means of a minimum thermometer laid directly upon a surface of short grass, and by means of a thermometer laid on the bare ground and lightly covered with earth.

The difference between the minimum temperature in the free air and that of the air close to the grass or the surface of the earth is a measure of the loss of heat by nocturnal radiation. Observations of this sort, although easily made, are nevertheless not available for many climates. The English meteorological stations alone are generally provided with radiation thermometers.

In Vienna, the readings of a minimum thermometer which was freely exposed on the grass averaged lower than those of the minimum thermometer in the shelter, 4 or 5 feet above the surface, by the following amounts: In spring, 1.3°; in summer, 1.8°; in autumn, 1.3°; mean monthly extremes, in spring, 2.1°. We may therefore conclude that frost can occur in the neighborhood of Vienna even when the mean nocturnal minimum temperature is +2° to +3°. These differences are still greater in drier climates, especially at great altitudes above sea level; and frost can occur when the air temperature is 5° to 6°, if radiation is favored by a clear sky, and if the absence of wind makes it possible for considerable differences of temperature to be produced between bodies in the air and the air itself. On the dry plateau of Yemen, with a nocturnal minimum of only +8°, Glaser saw the pools in the vicinity frozen over in the early morning. (*L. c.*, pp. 41 and 42.)

III. EQUIPMENT OF MIRADOR OBSERVATORY.

In the beginning of the present year the meteorological station at Baguio was transferred definitively to the top of Mount Mirador, and the installation of the new equipment commenced. By the end of June all the instruments were in working order and the new observatory began its regular work on July 1, 1909. The station is provided with the following instruments:

1. **Meteorological instruments.**—The equipment for meteorological observations is very complete, as may be seen from the following enumeration:

One Friez anemograph, mounted on the highest crag of the summit, at a distance of 34 meters

north of the building. (See Plate VIII.) The recording apparatus of this instrument is of the type known as "Quadruple register," since it registers—electrically—the direction of the wind, its velocity, the rainfall, and sunshine. It is located in the office of the observatory, which is situated in the southeastern tower.

One Richard anemograph, mounted on the roof of the tower which contains the office. This apparatus gives continous records of wind directions and velocities on a register installed on the upper floor of the same tower.

Two mercurial barometers and a Richard barograph have their places in the office already mentioned.

South of the building, at a distance of some 35 meters, is the meteorological park, an inclosure within which are mounted the following instruments: One Marvin electric heliograph, one Campbell sunshine-recorder, one electrically registering rain gauge. Moreover, the thermometer shelter which contains, besides the usual maximum and minimum, dry and wet bulb thermometers, one Piché evaporimeter and one Richard psychrograph. Outside of the thermometer shelter are exposed one maximum thermometer (black bulb in vacuo), one minimum thermometer for observing grass temperatures, and one Piché evaporimeter. The upper view on Plate IX gives an idea of this installation. At the same time it shows the strange and fascinating sight offered by the depressions around Mirador in the early morning of some days, when they are filled with heavy fog. The lower view on the same plate exhibits the same phenomenon as seen when looking in a different direction.

On the slopes of the mountain are distributed at different heights three additional rain gauges and a number of minimum thermometers, which latter serve to record the grounds' radiation.

2. **The microseismograph.**—This instrument, of the Omori type, consisting of two horizontal pendulums, was built in the mechanics' shop of the Weather Bureau. The bob of each pendulum weighs 126 kilograms (256 pounds). The horizontal distance between the pivots and the centers of the weights is 72 centimeters (28.3 inches); the vertical distance from the points of suspension to the pivots, 155 centimeters (61 inches); the amplification, 10. The periods of oscillation are slightly unequal, being 11.4 seconds for the pendulum swinging N–S, and 12 for the other which registers the E–W component. The apparatus is mounted in the southwestern tower on a solid pier of stone and cement which rests on the native rock of the summit. It is expected that this microseismograph will record all the important earthquakes of the world which have their origin at great depths. Some instances of disturbances recorded simultaneously at Baguio and Manila may be interesting.

SOME DISTANT EARTHQUAKES REGISTERED ON MOUNT MIRADOR AND IN MANILA, 1909.

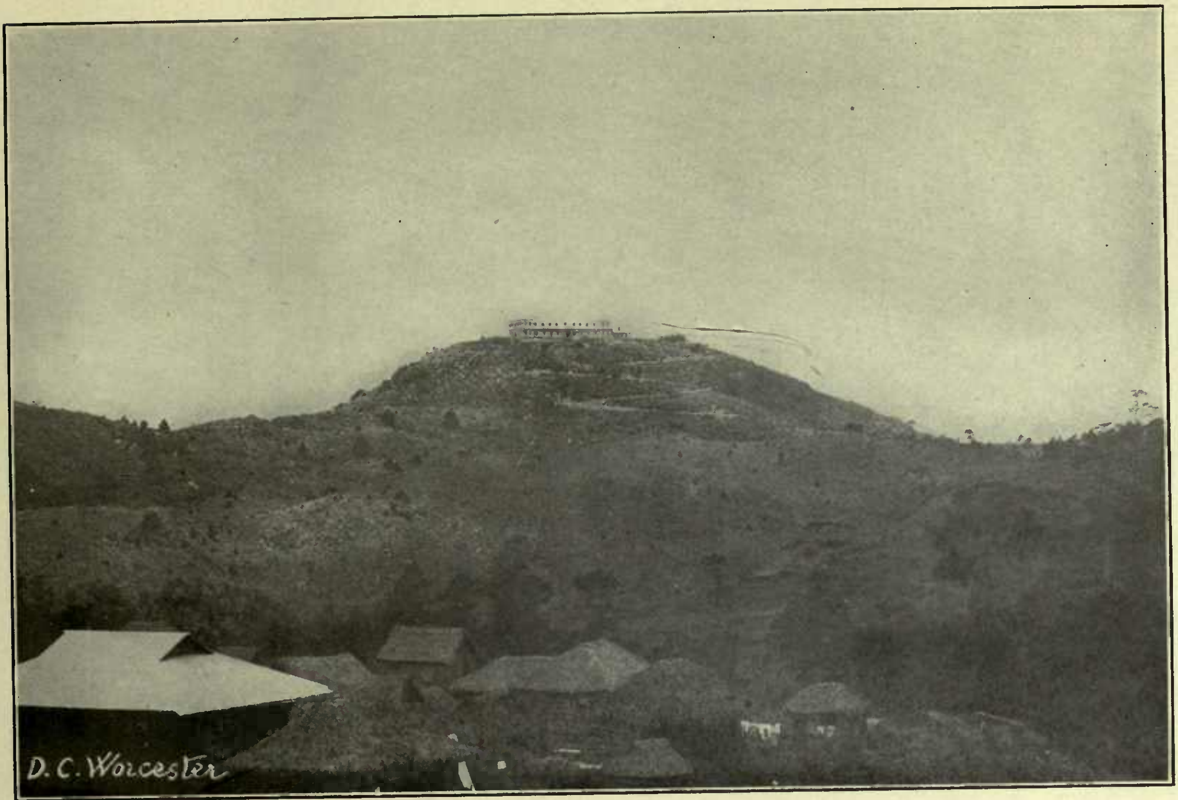
Date and station.	Beginning.	End.	Duration.
March 13:	*h. m.*	*h. m.*	*h. m.*
Mirador	7 5 a. m.	9 16 a. m.	2 11
Manila	7 5 a. m.	9 22 a. m.	2 17
Mirador	10 35 p. m.	0 23 a. m.	1 48
Manila	10 35 p. m.	0 27 a. m.	1 52
April 15:			
Mirador	3 56 a. m.	5 4 a. m.	1 8
Manila	3 56 a. m.	5 4 a. m.	1 8
April 27:			
Mirador	8 49 p. m.	10 29 p. m.	1 40
Manila	8 49 p. m.	10 23 p. m.	1 34
May 26:			
Mirador	4 2 a. m.	4 20 a. m.	0 18
Manila	4 2 a. m.	4 20 a. m.	0 18
Mirador	10 9 a. m.	11 29 a. m.	1 10
Manila	10 9 a. m.	11 54 a. m.	1 45
May 31:			
Mirador	5 6 a. m.	5 50 a. m.	0 44
Manila	5 6 a. m.	6 14 a. m.	1 8

3. **Special telegraph line.**—Through the generous interest taken in the work of the Weather Bureau by the Director of Posts, a special telegraph line has been constructed from the Baguio post-office to Mirador Observatory, which enables us to send the official time of the Archipelago directly from Manila Observatory to Mount Mirador.

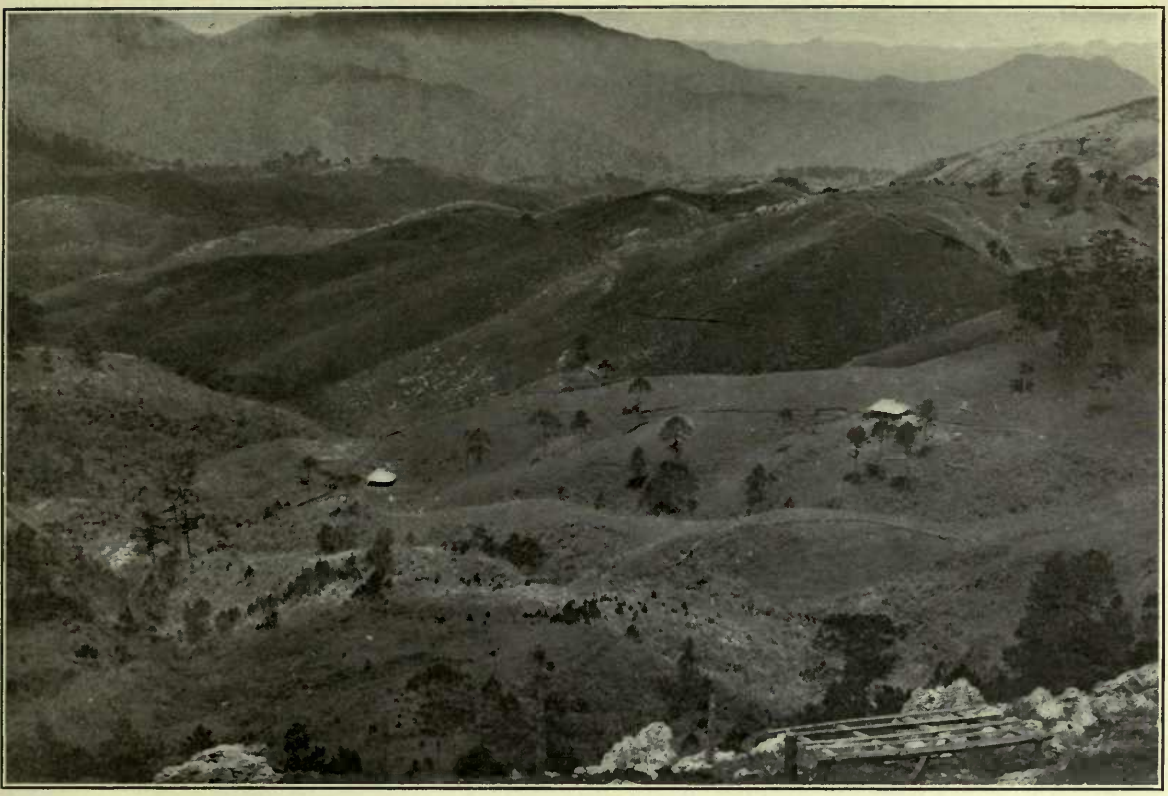
Personnel.—The personnel in charge of Mirador Observatory consists at present of one chief observer, one third-class observer, one assistant, and one mechanic.

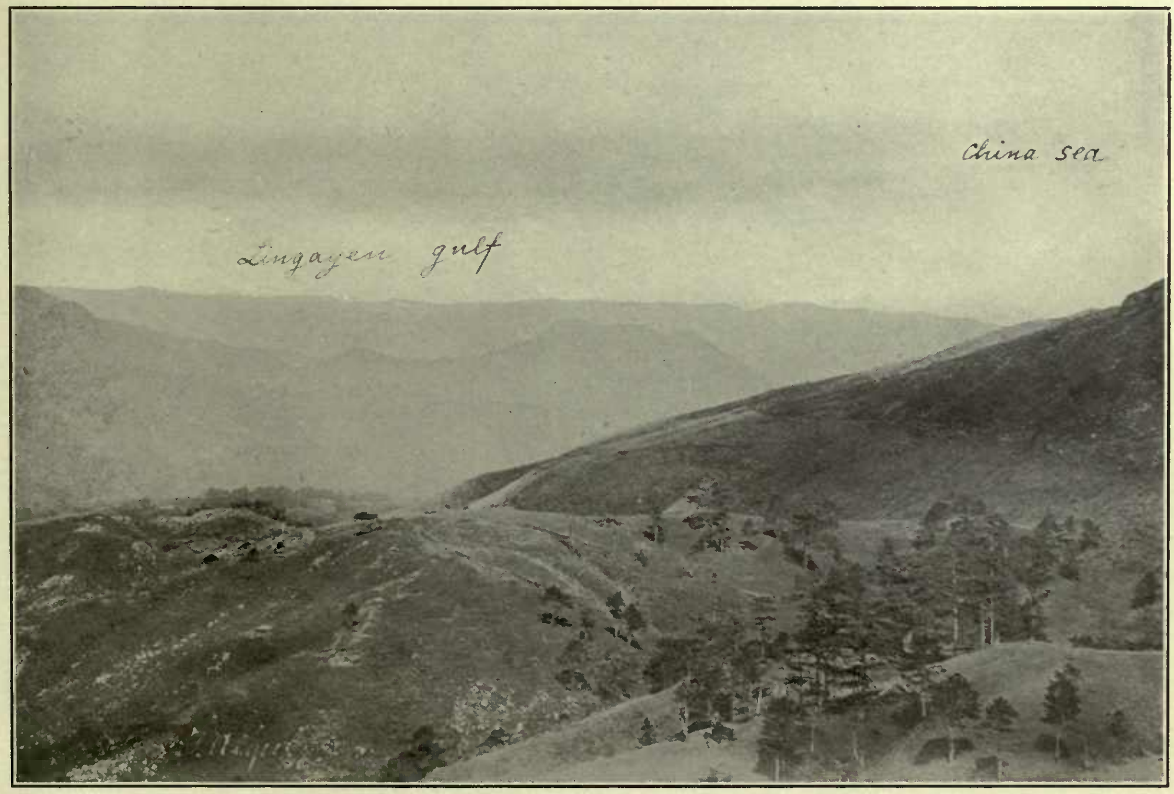
Wireless telegraph station.—It is planned to erect, either on Mirador, or on one of the surrounding, slightly higher hills, a wireless telegraph station for the purpose of distributing typhoon warnings to ships at sea within a radius of at least 600 miles, and of receiving their reports on meteorological conditions prevailing in their neighborhood. It is true that at present only Government vessels are equipped with radiographic apparatus; but ~~the time~~ is not far distant when such installations will be common on board of the larger steamers. The realization of the idea is assured, unless exceptional conditions should be found to exist in the region to be traversed by the magneto-electric waves, such as would make wireless communication from and to Mirador impossible. Whether such disturbing influences are present or not will have to be found out by actual trial.

O

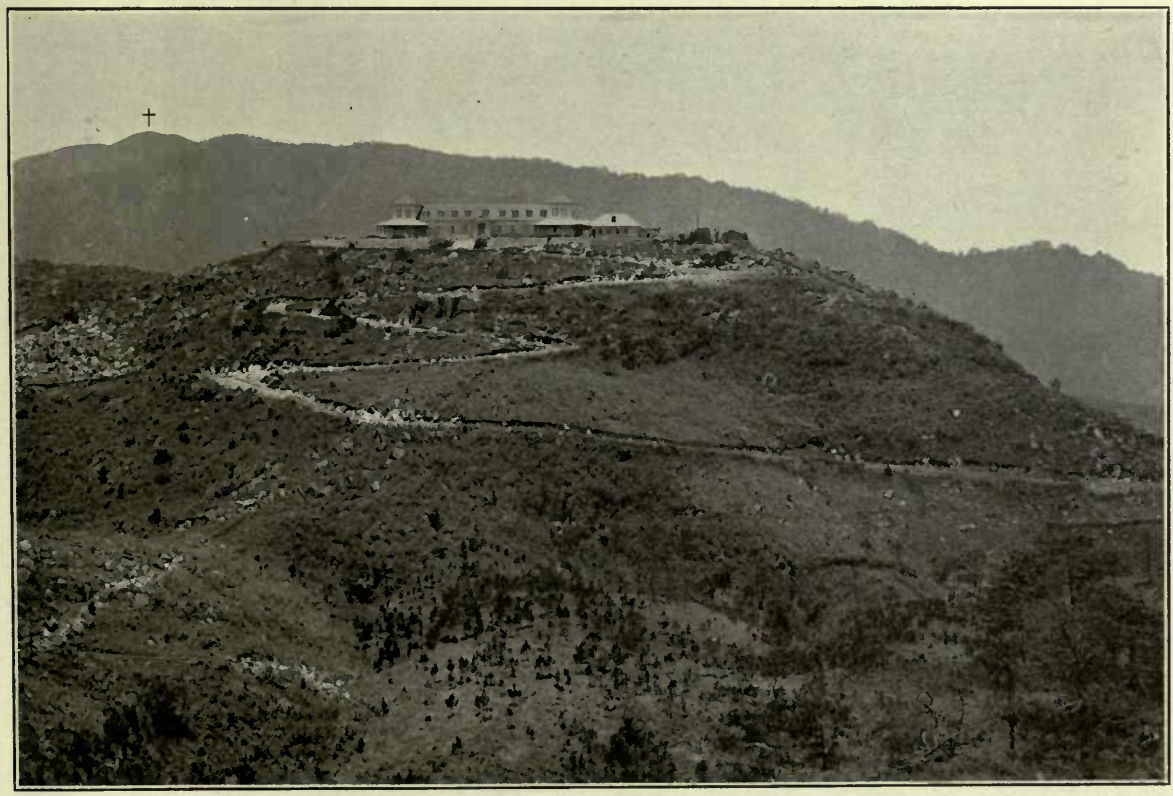

D.C. Worcester

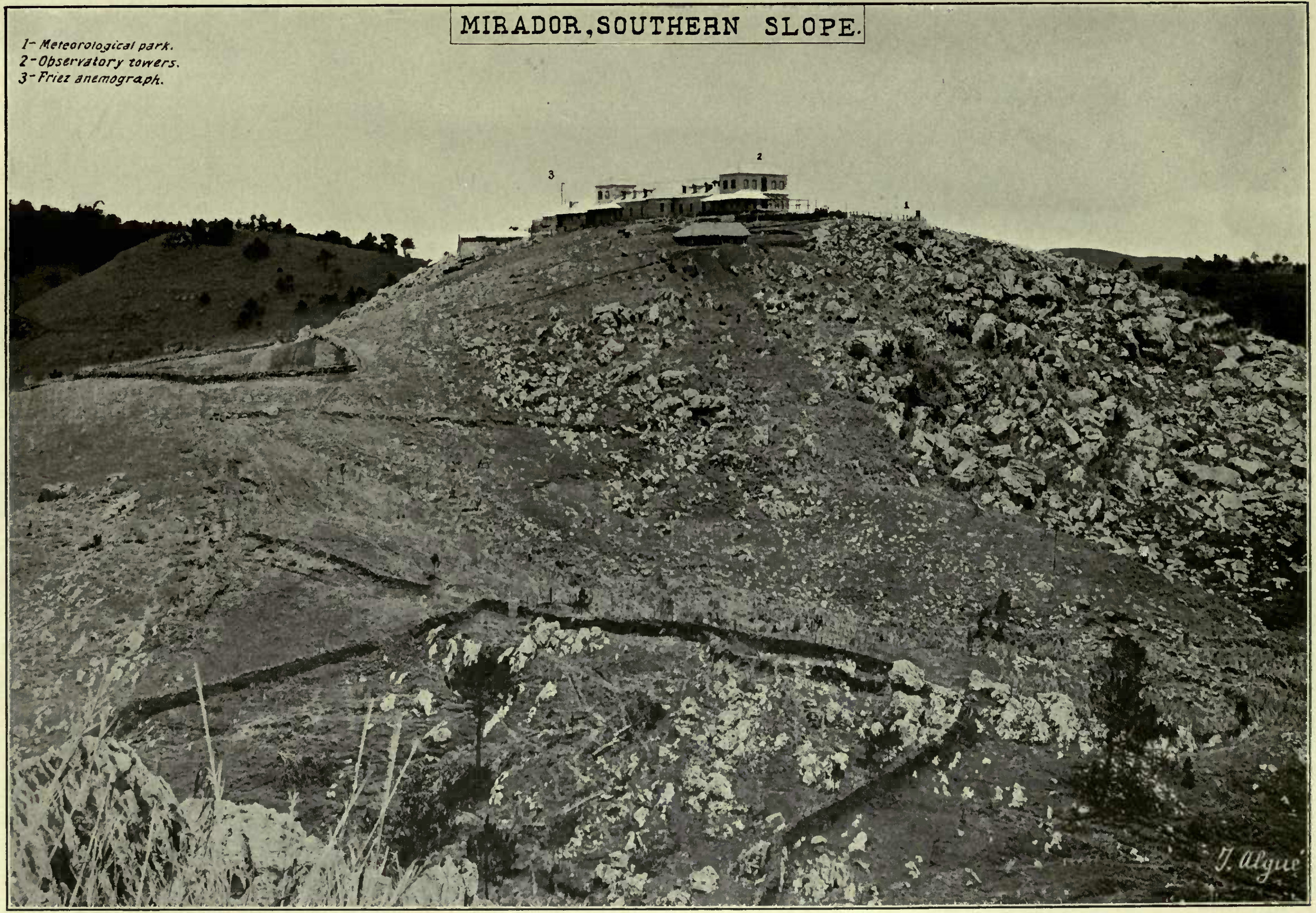

Ch. Martin

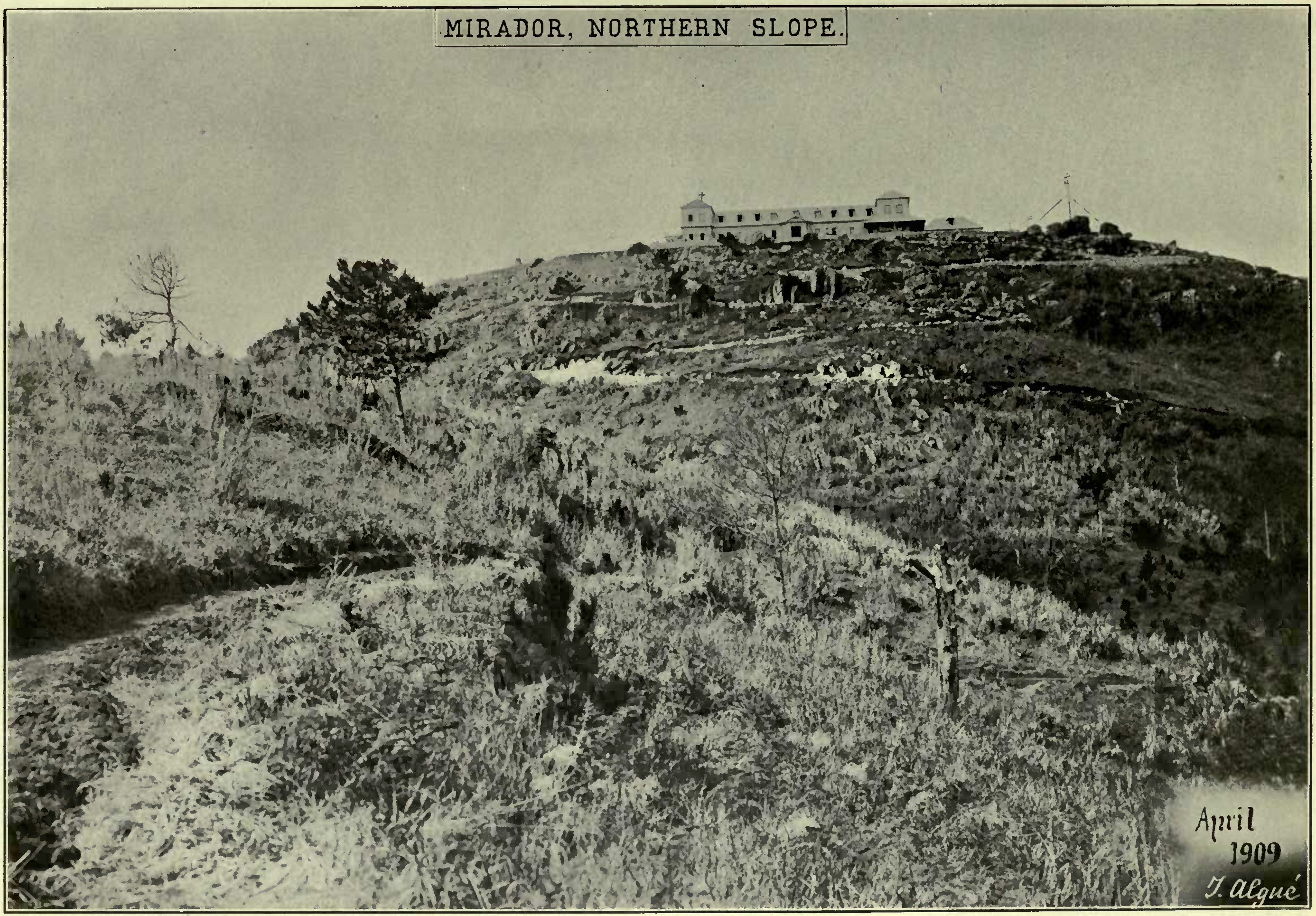



China sea
Lingayen gulf

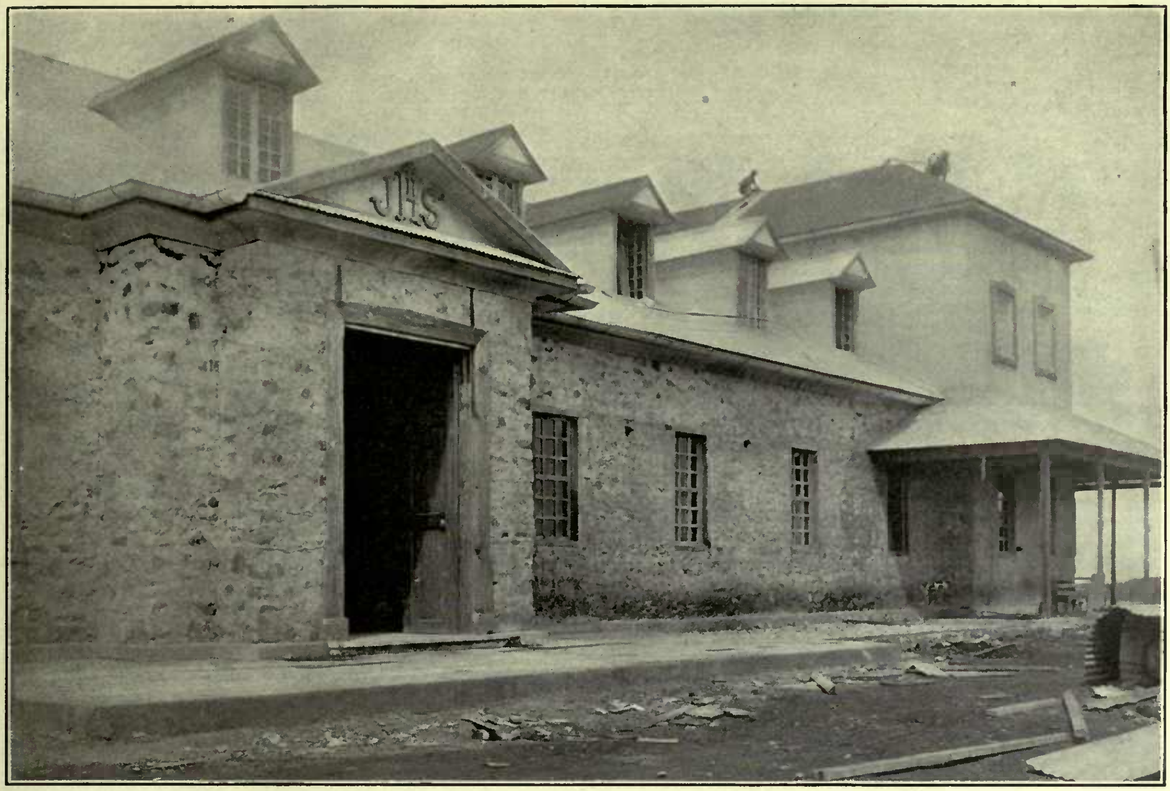

M. Solá




MIRADOR, SOUTHERN SLOPE.
1- Meteorological park.
2- Observatory towers.
3- Friez anemograph.
1
2
3
J. Algué



MIRADOR, NORTHERN SLOPE.


JHS

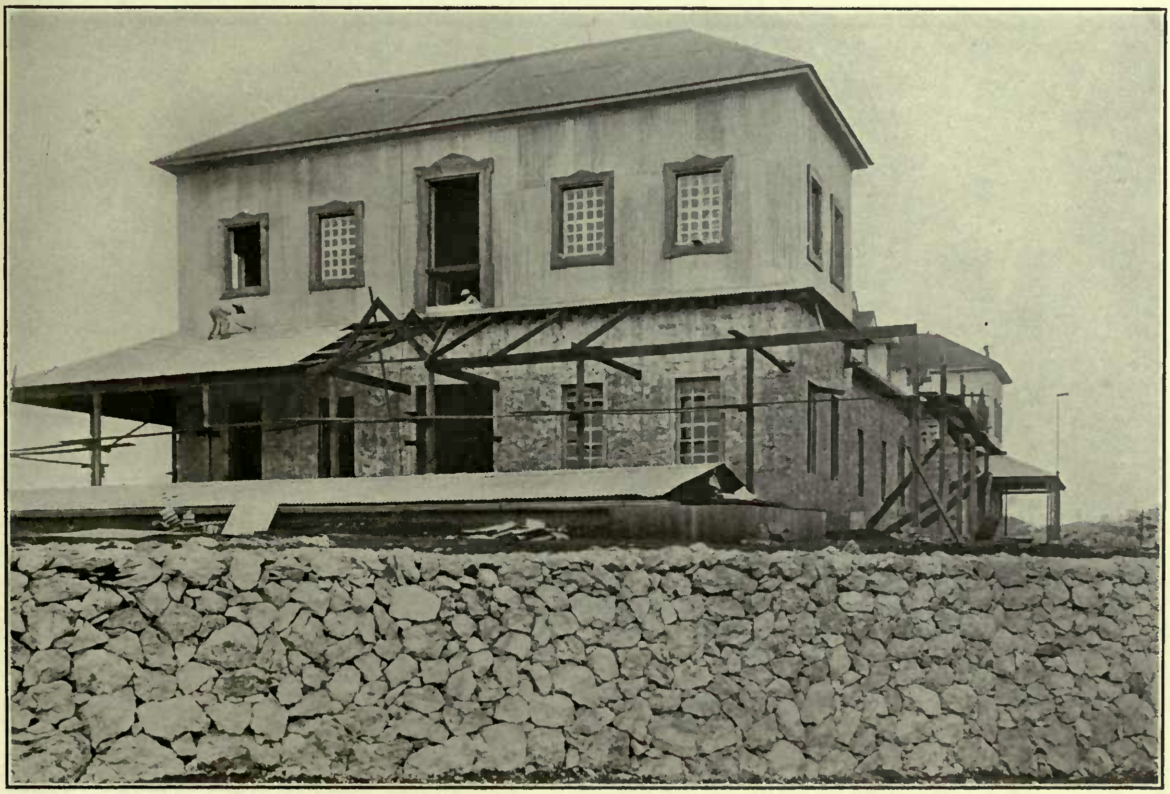


Plate VII.

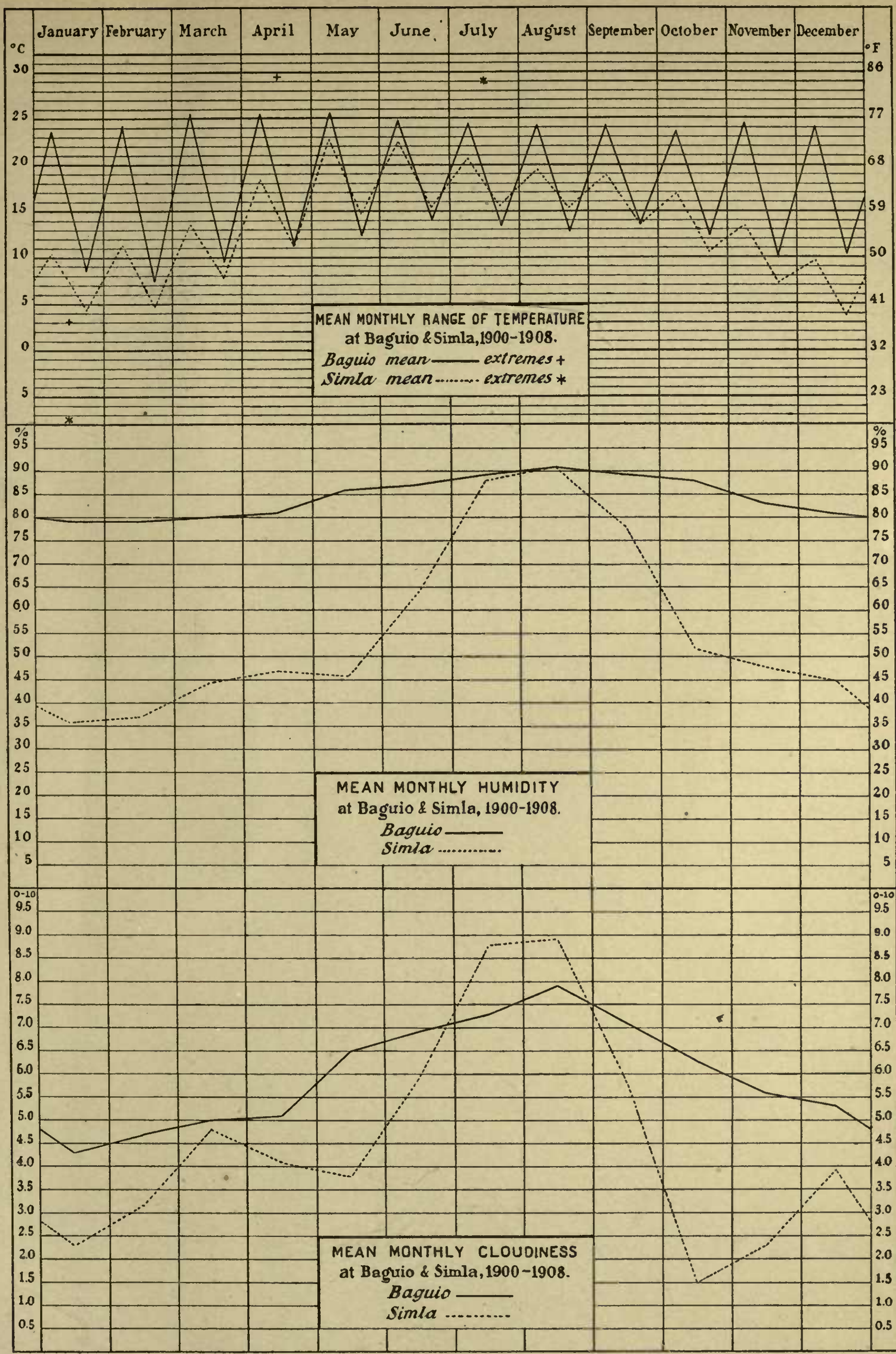
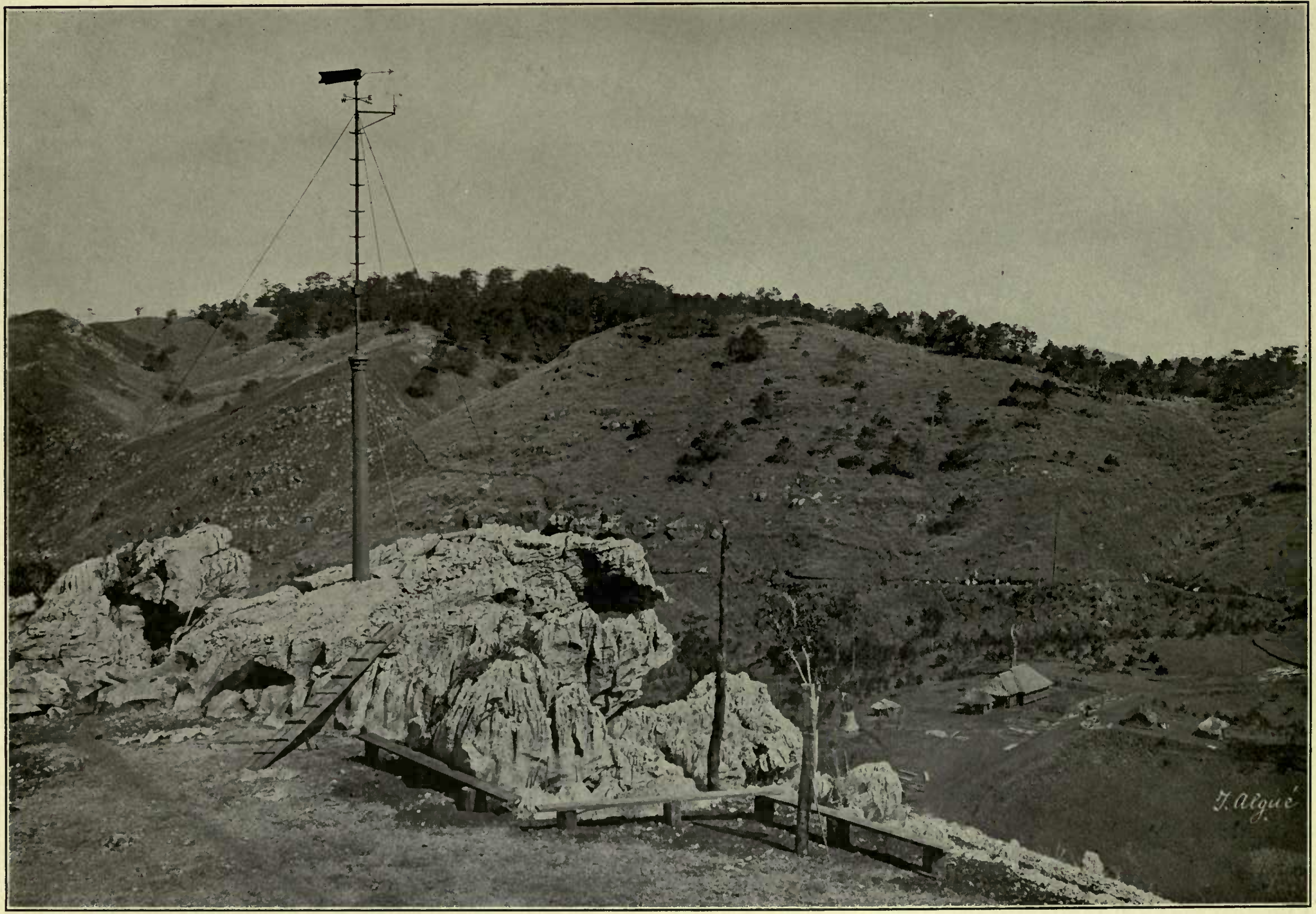

January
February
March
April
May
June
July
August
September
October
November
December
°C
°F
MEAN MONTHLY RANGE OF TEMPERATURE
at Baguio & Simla, 1900-1908.
Baguio mean —— extremes +
Simla mean .... extremes *
%
MEAN MONTHLY HUMIDITY
at Baguio & Simla, 1900-1908.
Baguio ——
Simla ....
0-10
MEAN MONTHLY CLOUDINESS
at Baguio & Simla, 1900-1908.
Baguio ——
Simla ....

Plate VIII.




METEOROLOGICAL PARK
Alt. - 4953 ft.
Shelter for thermometers 1
Grass thermometer 2
Actinometer 3
Rain gauge (electric) 4
Heliometer 5
Vaporimeter 6
1
2
3
4
5
6


FROM MIRADOR LOOKING TOWARDS NE.
before sun rise 5-40 a.m. April 20th, 1909.
J. Algué

7